

## SOEMMERING'S RING AND ITS DISLOCATIONS\*

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SOEMMERING'S ring is a special form of after-cataract which is formed in the following ways:

In extra-capsular extraction of cataract in which the central portion of the anterior capsule is removed, or in injury of the lens, or in discission operations in which the anterior capsule is torn and the central portion of the lens substance is penetrated and becomes absorbed, a greater part of the capsule sac remains intact. According to Wessely (1910), when the central part of the anterior capsule is opened up, it then loses its stretching capacity and collapses, forming at first a flat ring. Now filaments of the lens substance frequently remain at the equator of the capsule sac; with this also remain parts of the lens nucleus and subcapsular epithelium. The torn anterior capsule then becomes retracted and adheres to the posterior capsule at the margin, so that the remains of the lens fibres cannot be absorbed and therefore form a ring of folded capsule. The epithelial cells can grow in this ring and, associated with the deposition of hyaline capsular material in the remains of the lens substance, a swollen ring or cushion is formed. This ring, remaining hidden behind the iris and being held in position by the zonule of Zinn, cannot be seen in the ordinary eye. There is also practically no disturbance of vision when the ring hangs in its original position, because the central portion always remains clear. When operative treatment for high myopia was in vogue, such ring formations were not uncommon. The procedure known as Fukala's operation had as its first step the discission of the lens; the swollen lens material formed as the result of discission was then washed out, and in most cases parts of the anterior and posterior capsule with remains of lens fibres and subcapsular epithelium were left behind and formed a swollen ring. This ring in its typical form can also arise after discission of congenital cataract.

The name derives from D. W. Soemmering of Mainz who examined a number of eyes of dead persons, who had been operated upon in life for cataract. He dissected these eyes through the equator and in eight cases saw more or less crystal clear, nearly invisible, ring-like substances behind the iris. When the dissected eyes were immersed in spirit, these almost invisible rings became

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opaque. His observations (1828) were followed by those of Werneck (1834) and Textor (1842).

The formation of Soemmering's ring was very plainly shown in animal experiments by Dieterich (1824) and Cochteau and Leroy-d'Étiolle (1827). More recently the experiments of Gonin (1896) and Wessely (1910) showed that the ring formations arise more easily in young animals than in old ones. It is likely that the epithelial cells in young animals have a greater capacity for growth than those of old animals.

In its typical form, Soemmering's ring can only be diagnosed clinically after its dislocation has taken place, when a coloboma of the iris has been made, or when the pupil has been widely dilated. It is interesting to find that all cases of Soemmering's ring so far published, as well as the author's own case, showed dislocations, and it is very likely that the diagnosis of all these reported cases was made only by chance after dislocation had occurred. It is perhaps worth while therefore, to discuss the factors favouring dislocation. According to Poos (1931) these are:

- (1) The early age of the patient when the lenticular injury occurs favouring the formation of a relatively strong ring.
- (2) Progressive myopia gradually producing degeneration of the vitreous and of the zonules in later life.
- (3) Injury.

After reviewing eleven cases so far published (see Table, overleaf), the author is of opinion that the factors which cause dislocation of Soemmering's ring are the following:

(1) FORMATION OF THE RING AT AN EARLY AGE.—From the ages given in the table, we see that with the exception of one 62-year-old patient (in which the ring was only partially formed), the history of injury belonged to the early years of life. Injury at an early age is an important factor because the young cell elements are then more capable of growth, which at first takes place from the subcapsular epithelium. The ring has also sufficient time to grow fairly large with age, and the size and increased weight of the swollen ring favour its dislocation.

(2) MYOPIA.—Seven cases (1, 3, 6, 7, 9, 10, and 11) were found in highly myopic eyes. It is probable that in Jess's second case (Case 5, glasses for correction of the aphakic eye for distant vision being +9 D sph.) a certain degree of myopia was present. Out of the eleven cases therefore, eight were myopic. The degeneration of the zonules, the liquifaction of the vitreous, the small and weak ciliary muscles, and the deep anterior chamber, which are the usual changes in a myopic eye, no doubt facilitate the dislocation of the ring after a slight injury. The deepening of the anterior chamber and the liquifaction of the vitreous favour its forward or backward dislocation according to the type of injury or movement of the head.

TABLE—SUMMARY

Case No.	Investigator and date	Lenticular injury or operation	Age at injury or operation	Age when Soemmering Ring due to dislocation was observed	Nature of dislocation	Cause of dislocation
1	Wessely (1910)	Lenticular injury by a needle	3	72	In vitreous	? Spontaneous
2	Adam (1911)	Extra-capsular extraction	48	61	In anterior chamber	? Spontaneous
3	Schneider (1927)	Operation for traumatic cataract	30	50	In anterior chamber	? Spontaneous
4	Jess (1931)	Operation for congenital polar cataract	17	57	In anterior chamber	? Spontaneous
5	Jess (1931)	Extra-capsular extraction	62	76	In anterior chamber	Direct contused injury
6	Poos (1931)	Fukala's operation	12	45	In vitreous	Direct contused injury
7	Poos (1931)	Fukala's operation	10	40	In vitreous	Indirect shaking of eyeball by fall
8	Lijo Pavia (1931)	Lenticular injury—traumatic cataract	In childhood	Not mentioned	Partly in anterior chamber, partly in vitreous	? Injury
9	Tooke (1933)	Fukala's operation	28	43	Partly in anterior chamber, partly in vitreous	Contusion of eye
10	Jacoby and Wolpaw (1935)	Extra-capsular extraction	36	66	In anterior chamber	Spontaneous
11	Guha (1938)	Extra-capsular extraction both eyes (? Congenital cataract)	22, left 31, right	51, left eye	In anterior chamber	Spontaneous

## OF PUBLISHED CASES

Result of dislocation	Vision of affected eye		Refraction of eyes	Changes in affected eye	Appearance of ring	Microscopical findings of ring
	Before dislocation	After dislocation				
Visual disturbance	Finger counting at 2 m.	? Cannot count fingers	High myopia	Myopic changes in fundus and vitreous fluid	Intense white	Not examined
Glaucoma	Not mentioned	Finger counting at 2 m.	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Glaucoma	Not mentioned	20/40	Myopia	Not mentioned	Contents milky	Not mentioned
Glaucoma	F.M. only	F.M. nil	No myopia	Not mentioned	Contents half milky, half calcified	Not mentioned
Glaucoma	5/10	3/35	Myopia (aphakia corrected +9D sph.)	Not mentioned ? Senile changes	Partially-formed ring	Not mentioned
Visual disturbance	Not mentioned	6/12	High myopia	Myopic changes in fundus	Partly transparent, partly opaque	Not mentioned
Visual disturbance	Not mentioned	6/15	High myopia	Myopic changes in fundus	Partly transparent, partly opaque	Not mentioned
Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
? Glaucoma	6/15	6/30	High myopia	Not mentioned	Like a uterus	No hyperplasia of cubical epithelial cells, no sign of hyaline degeneration
Marked ciliary injection. No Glaucoma	Not mentioned	Not mentioned	Myopia	Not mentioned	Not mentioned	Not mentioned
Glaucoma	Not known	5/15	Myopia	Myopic changes in fundus	*Whole ring white and completely opaque	Complete calcification

\* N.B.—The ring in right eye could also be seen in position after dilating the pupil.

(3) SENILE CHANGES IN THE EYE.—By reviewing the ages at which dislocation had taken place, we find that these were 72, 61, 50, 57, 76, 39, 45, 66, and 51 years. Although the formation of the rings must have taken place in all these cases in the early years of life (judging from the history of injury or operation), the dislocations have taken place in later years. It may be concluded therefore, that the degenerative and dystrophic processes in the senile eye causing changes in the zonules and vitreous favour dislocation of the ring.

(4) DEGENERATIVE CHANGES IN THE RING ITSELF.—These changes are calcareous, morgagnian, and probably fatty degenerations. Complete calcification was noticed in the author's case (Case 11) and partial calcification in Jess's first case (Case 4). In these cases the rings were found to be white, uneven, and crystalline. These changes may help in the dislocation of the ring by increasing its consistency and specific gravity.

(5) TRAUMA.—Direct contused injury or direct violent shaking of the eyeball (5, 6, and 9) and indirect shaking of the eyeball (Case 7) or a violent fall without a direct blow on the head may also produce dislocation of the ring.

(6) SPONTANEOUS DISLOCATION.—In the author's case (Case 11) dislocation of the ring in the anterior chamber took place during work in a bent position, the patient being a painter. In Cases 1, 2, 3, and 4, the dislocations were probably also spontaneous.

The sequelae of dislocation may differ different according to the type of displacement of the ring. Dislocation in the anterior chamber (as in Cases 2, 3, 4, 5, 10, and 11) causes secondary glaucoma. In five out of these six cases symptoms of secondary glaucoma were present; in Case 10, there were no symptoms of glaucoma but that of irritation. In Cases 1, 6, and 7, the dislocation was into the vitreous, which causes no other symptom except disturbance of vision. In Cases 8 and 9, the dislocation was partly in the anterior and partly in the posterior chamber.

We now see that Soemmering's ring differs from ordinary after-cataracts in many ways, of which the first and the last are the most noteworthy:

- (1) In most cases, it is clinically invisible when it remains in its original position.
- (2) It does not usually cause any visual disturbance.
- (3) It has a peculiar ring-like shape.
- (4) It is usually formed at an early age.
- (5) The presence of both the anterior and posterior capsules associated with lens fibres are *always* necessary for its formation.
- (6) When formed at an early age, it grows fairly large with advancing years.
- (7) Unlike the ordinary after-cataract, it dislocates easily.

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